Aviation Investigation Final Report

Location:	READING, Pennsylvania	**Accident Number:**	NYC00LA050
Date & Time:	December 11, 1999, 08:15 Local	**Registration:**	N6715U
Aircraft:	Mooney M20-C	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor, 2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Shortly after takeoff, the pilot experienced a loss of engine power, and performed a forced landing. Examination of the engine revealed a 1-inch by 6-inch hole, in the engine crankcase adjacent to the number two cylinder, and a fractured number two cylinder connecting rod. Additionally, the crankshaft installed in the engine, required the installation of sludge tubes in the crank-pins. Examination of the crankshaft revealed that the sludge tubes had not been installed. According to a representative of the engine manufacturer, the crankshaft installed in the engine was not approved for use in that model engine. Additionally, the absence of the crankshaft sludge tubes would not allow pressure oil to reach the connecting rod bearings and the connecting rod bearings would only receive splash, vapor and centrifugal force oil. The engine had been operated for about 940 hours since it was overhauled on April 16, 1990 and there were no logbook entries which indicated the crankshaft had been removed or replaced since the overhaul.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the number two connecting rod after an improper overhaul by maintenance personnel.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) ENGINE ASSEMBLY,CONNECTING ROD - FAILURE
2. (C) MAINTENANCE,OVERHAUL - IMPROPER - OTHER MAINTENANCE PERSONNEL

Occurrence #2: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF

Findings
3. TERRAIN CONDITION - SOFT

Factual Information

On December 11, 1999, about 0815 Eastern Standard Time, a Mooney M20-C, N6715U, was substantially damaged during a forced landing shortly after takeoff from the Reading Regional/Carl A Spaatz Field, Reading, Pennsylvania. The certificated commercial pilot and one passenger were not injured. A second passenger sustained minor injuries. Visual meteorological conditions prevailed and no flight plan had been filed for the personal flight conducted under 14 CFR Part 91.

According to the pilot, he performed a preflight inspection of the airplane and noted there were 8 quarts of oil in the engine. After a normal engine run-up, the airplane departed. The airplane had turned crosswind, and was about 1,000 feet agl (above ground level), when the engine began to run "real rough." The pilot then heard a loud noise, which was followed by a total loss of engine power. Additionally, oil was splattered on the windshield, and the pilot observed some smoke in the cockpit.

The pilot performed a forced landing to a beach adjacent to a lake.

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed a 1-inch by 6-inch hole, in the engine crankcase adjacent to the number two cylinder. The engine was retained for further examination.

Examination of the engine performed at Textron Lycoming, Williamsport, Pennsylvania, under the supervision of an FAA inspector revealed a fractured number two cylinder connecting rod. The top and bottom left half of the engine crankcase was broken away in-line with the separated number two cylinder connecting rod. Additionally, the crankshaft, part number 74250, installed in the engine, required the installation of sludge tubes in the crank-pins. Examination of the crankshaft revealed that the sludge tubes had not been installed. The fractured portions of the number two cylinder were forwarded to the Safety Board's Materials Laboratory, Washington, DC, for examination.

Examination of the fractured number two connecting rod by a Safety Board metallurgist revealed that the connecting rod fractured through both arms in the areas located at a distance of about 1 1/8 inches from the rod cap joint. Additionally, the bearing surface of the rod contained evidence of heat discoloration. Large portions of both fracture faces had a smooth and silky appearance, and contained crack arrest positions indicative of fatigue cracking. The fatigue origins of both fractures were damaged after the separation, and could not be determined.

According to a representative of the engine manufacturer, the engine was certified with a crankshaft, part number 74966, which did not utilize sludge tubes, and only crankshafts which

did not require sludge tubes were approved for use in the accident engine. Additionally, the absence of the crankshaft sludge tubes would not allow pressure oil to reach the connecting rod bearings and the connecting rod bearings would only receive splash, vapor, and centrifugal force oil.

Textron Lycoming Service Instruction No. SI-1113A, discussed the discontinuance of crankshafts manufactured with sludge tubes. The service instruction stated in part:

"This service instruction must not be interpreted to imply that sludge tubes may be omitted during assembly of crankshafts designed to use them; these crankshafts must be assembled with sludge tubes. Engine failure will result if sludge tubes are omitted from crankshafts designed to use them...."

Review of the airplane's maintenance records revealed the engine was overhauled by Penn Yan Aero Service, Inc., Penn Yan, New York, on April 16, 1990. There were no logbook entries which indicated the crankshaft had been removed or replaced since the engine was overhauled. The engine had been operated for about 940 hours since the overhaul.

Pilot Information

Certificate:	Commercial	**Age:**	43,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	June 14, 1999
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	1875 hours (Total, all aircraft), 100 hours (Total, this make and model), 1610 hours (Pilot In Command, all aircraft), 3 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N6715U
Model/Series:	M20-C M20-C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2447
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	December 9, 1998 Annual	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:	75 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4600 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	O-360-A1D
Registered Owner:	PAUL L. BENDIGO	**Rated Power:**	180 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RDG ,344 ft msl	**Distance from Accident Site:**	
Observation Time:	08:54 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	16 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	3°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(RDG)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	08:10 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	READING REGIONAL RDG	**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor, 1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 2 None	**Latitude, Longitude:**	40.400627,-75.939468(est)

Administrative Information

Investigator In Charge (IIC):	Schiada, Luke
Additional Participating Persons:	ROD BOUREY; ALLENTOWN , PA ROBERT C OHNMEISS; WILLIAMSPORT , PA
Original Publish Date:	August 13, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=48347